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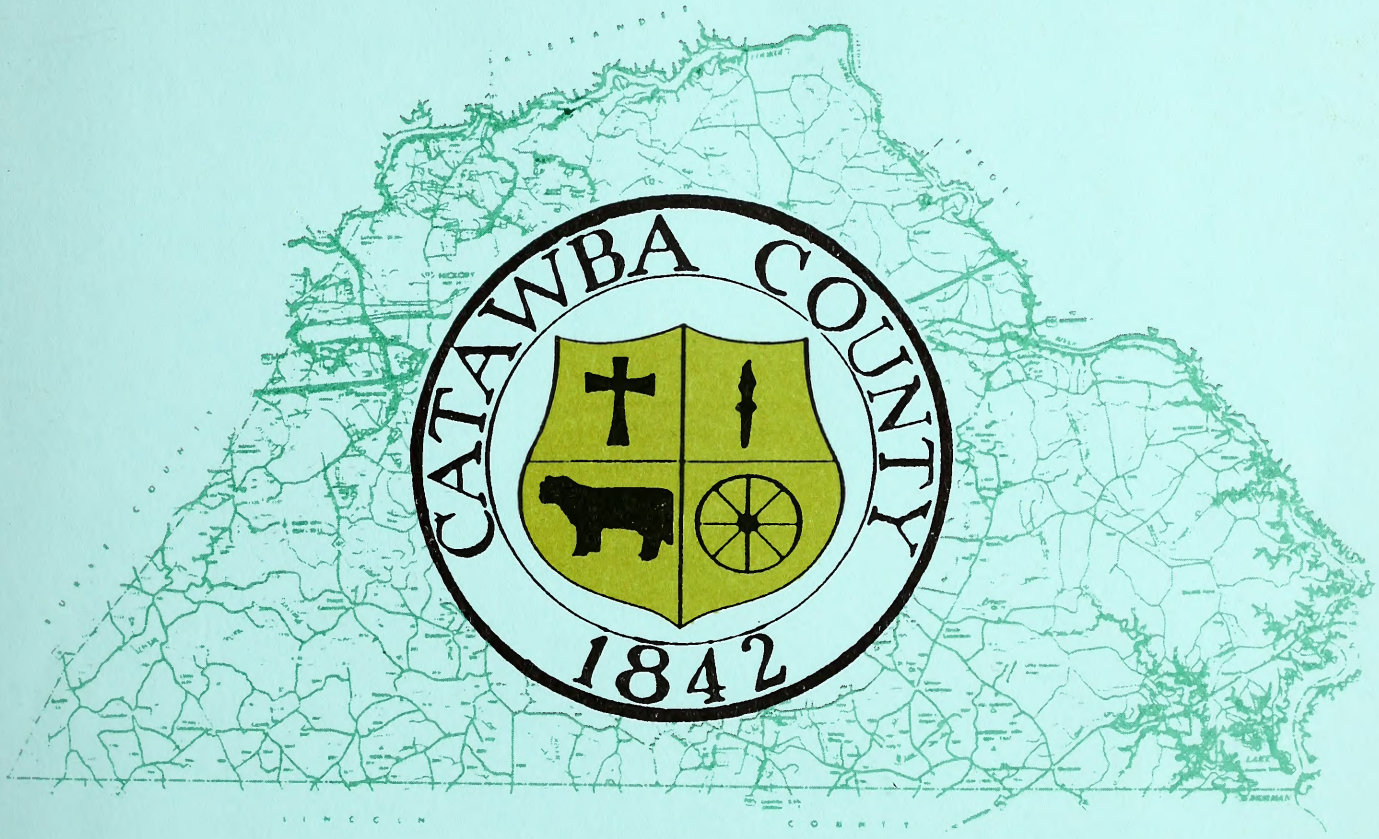


# 1991 THOROUGHFARE PLAN

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# THOROUGHFARE PLAN

**FOR**

# CATAWBA COUNTY, NORTH CAROLINA

Prepared by the:

Statewide Planning Branch
Division of Highways
N. C. Department of Transportation

In cooperation with:

The County of Catawba
The Federal Highway Administration
U. S. Department of Transportation

NORTH CAROLINA PROFESSIONAL SEAL 15853 ENGINEER LINH CONG NGUYEN

7-28-92

April 30, 1992

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# I. INTRODUCTION

A well planned transportation system is an asset to the economic and social well being of a growing community. It provides the means to transport people and goods from one place to another quickly and conveniently. A good highway system must not only meet the existing travel demands, but also be able to keep pace with the future development of the region. Thus, this report will identify some of the existing transportation problems in Catawba County and recommend a course of action for future development.

The proposed Catawba County Thoroughfare Plan was developed following the principles outlined in Section II of this report. Thoroughfares were located based upon existing and anticipated land use and population distribution, topographic conditions and field investigations. The plan advocates those improvements which are felt to be essential for proper traffic circulation within the 1990-2010 planning period. The plan does not attempt to modify the proposed thoroughfare plans already developed for the Hickory-Newton-Conover and Maiden urban areas.

The North Carolina Department of Transportation will be primarily responsible for improvements within the county plan. However, Catawba County could greatly contribute to the implementation of this plan by enforcing subdivision and zoning regulations. It is desirable that the plan be adopted by both the county and the Department of Transportation. The adopted plan can serve as a mutual official guide in the development of an effective thoroughfare system.

## II. COUNTY THOROUGHFARE PLANNING PRINCIPLES

### Purpose of Planning

There are many benefits to be gained from thoroughfare planning, but the main objective is to assure that the road system will be progressively developed to serve future travel desires adequately. Thus, the main consideration in thoroughfare planning is to make provisions for street and highway improvements so that, when the need arises, feasible opportunities to make improvements exist.

Streets, roads, and highways have two primary functions: they provide traffic service and land service. When combined, these two services are basically incompatible. This conflict will not be serious if both traffic and land service demands are low. However, when traffic volumes are high, access conflicts created by uncontrolled and intensely used abutting property result in intolerable traffic flow friction and congestion.

There are two major benefits derived from thoroughfare planning. First, each road or highway can be designed to perform a specific function and provide a specific level of service. This permits savings in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods and encourages stability in travel and land use patterns. Second, local officials are informed of future improvements and can incorporate them into planning and policy decisions. This will permit developers to design subdivisions in a non-conflicting manner, direct school and park officials to better locate their facilities, and minimize the damage to property values and community appearance that is sometimes associated with road improvements.

### County Thoroughfare Planning Concept

The underlying concept of the thoroughfare plan is to provide a functional system of streets, roads, and highways that permit direct, efficient, and safe travel. Different elements in the system are designed to have specific functions and levels of service, thus minimizing the traffic and land service conflict.

In the county plan, elements are designated as either urban or rural. In the urban planning area, the local municipality generally has planning jurisdiction. Outside the urban planning area, the county has planning jurisdiction. In those urban areas where no urban thoroughfare plan has been developed, elements are generally

designated as rural and under the planning jurisdiction of the county. When a thoroughfare plan is developed for an urban area that has not previously had a plan, then the area defined by that plan is considered to be urban and comes under the planning jurisdiction of the municipality.

Within the urban and rural systems, thoroughfare plan elements are classified according to the specific function they are to perform. A discussion of the elements and functions of the two systems follows.

## Urban Thoroughfare Classification System

In the urban thoroughfare plan, elements are classified as major thoroughfares, minor thoroughfares, or local access streets. The major thoroughfares are the primary traffic arteries of the urban area providing for traffic movements within, around, and through the area. Minor thoroughfares are designed to collect traffic from the local access streets and carry it to the major thoroughfare system. Local access streets, which may be further classified as residential, commercial, or industrial streets, are designed only to provide access to abutting property. Due to the limited amount of detail that can be shown on a county thoroughfare plan, only urban major thoroughfares are shown.

The coordinated system of major thoroughfares that is most adaptable to the desired lines of travel within an urban area and which is reflected in most urban area thoroughfare plans is the radial-loop system. The radial-loop system includes radials, crosstowns, loops, and bypasses. Radial thoroughfares provide for travel from points outside to major destinations inside the urban area. Crosstown thoroughfares provide for traffic movement across the central area and around the central business district (CBD). Loop thoroughfares provide for lateral travel movements between suburban areas. Bypasses are designed to carry non-local traffic around and through the area. Occasionally, a bypass with low through traffic volumes can be designed to function as a portion of the urban loop. Figure 1 illustrates the concepts of the radial-loop major thoroughfare system and the functionally classified urban street system.

## Rural Thoroughfare Classification System

The rural system consists of those facilities outside the urban thoroughfare planning boundaries. They are classified into four major systems: principal arterials, minor arterials, major and minor collectors, and local roads. Table 1 indicates generally accepted statewide mileage on these systems.

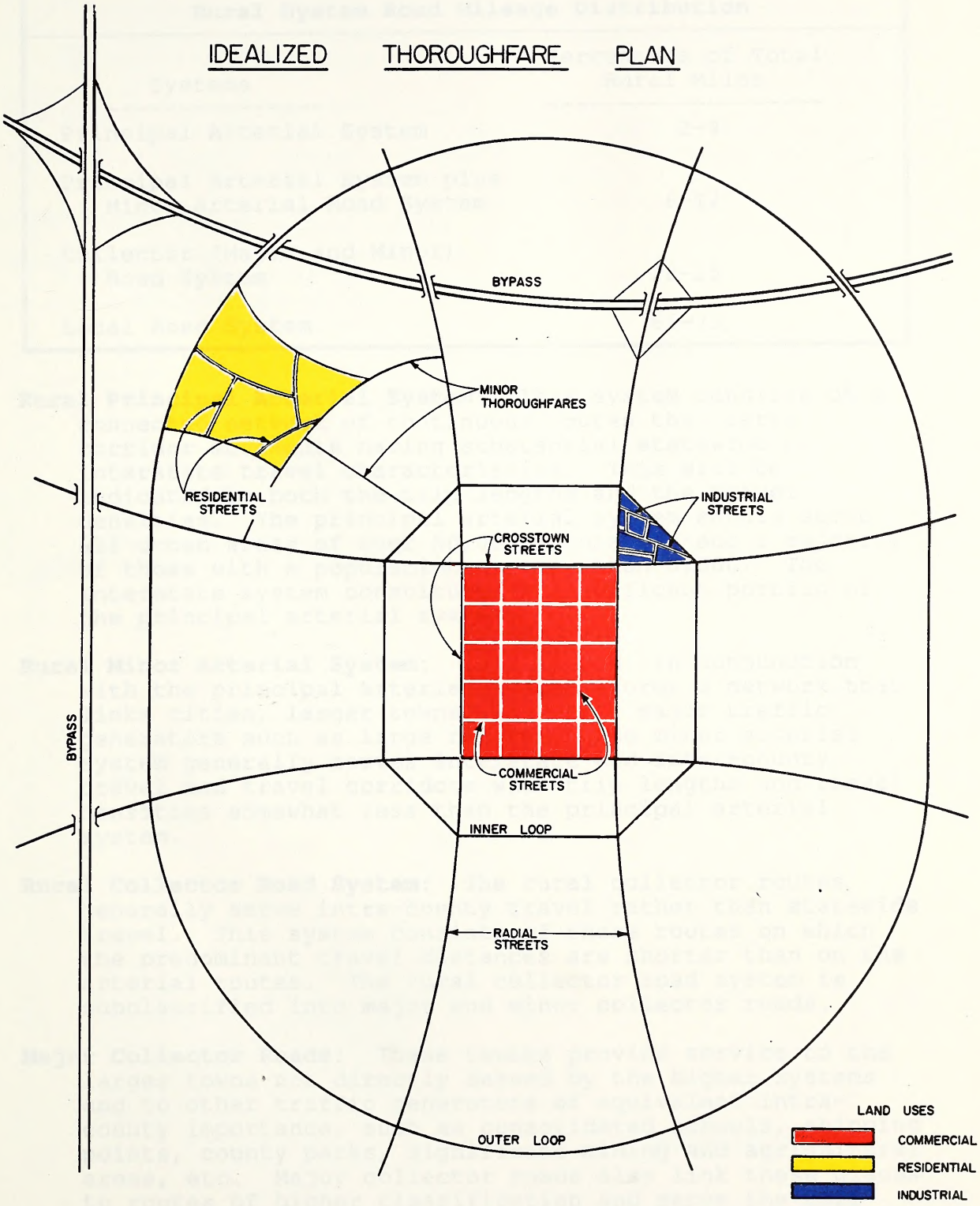

IDEALIZED THOROUGHFARE PLAN
BYPASS
MINOR THOROUGHFARES
RESIDENTIAL STREETS
INDUSTRIAL STREETS
CROSSTOWN STREETS
BYPASS
COMMERCIAL STREETS
INNER LOOP
RADIAL STREETS
OUTER LOOP
LAND USES
COMMERCIAL
RESIDENTIAL
INDUSTRIAL

FIGURE 1

| TABLE 1 | |
|---|---|
| **Rural System Road Mileage Distribution** | |
| Systems | Percentage of Total Rural Miles |
| Principal Arterial System | 2-4 |
| Principal Arterial System plus Minor Arterial Road System | 6-12 |
| Collector (Major and Minor) Road System | 20-25 |
| Local Road System | 65-75 |

**Rural Principal Arterial System:** This system consists of a connected network of continuous routes that serve corridor movements having substantial statewide or interstate travel characteristics. This will be indicated by both the trip lengths and the travel densities. The principal arterial system should serve all urban areas of over 50,000 population and a majority of those with a population greater than 5,000. The Interstate system constitutes a significant portion of the principal arterial system.

**Rural Minor Arterial System:** This system, in conjunction with the principal arterial system, forms a network that links cities, larger towns, and other major traffic generators such as large resorts. The minor arterial system generally serves interstate and inter-county travel and travel corridors with trip lengths and travel densities somewhat less than the principal arterial system.

**Rural Collector Road System:** The rural collector routes generally serve intra-county travel rather than statewide travel. This system consists of those routes on which the predominant travel distances are shorter than on the arterial routes. The rural collector road system is subclassified into major and minor collector roads.

**Major Collector Roads:** These routes provide service to the larger towns not directly served by the higher systems and to other traffic generators of equivalent intra-county importance, such as consolidated schools, shipping points, county parks, significant mining and agricultural areas, etc. Major collector roads also link these places to routes of higher classification and serve the more important intra-county travel corridors.

**Minor Collector Roads:** These routes collect traffic from local roads and bring all developed areas within a reasonable distance of a major collector road; provide service to the remaining smaller communities; and link the locally important traffic generators with the rural outskirts.

**Rural Local Road System:** The local roads are comprised of all roads that are not on a higher system. Local residential subdivision streets and residential collector streets are elements of the local road system. Local residential streets are either cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length that do not connect thoroughfares or serve major traffic generators and do not collect traffic from more than one hundred dwelling units. Residential collector streets serve as the connecting street system between local residential streets and the thoroughfare system.

Figure 2 gives a schematic illustration of a functionally classified rural highway system. Figure 3 shows the functional classification of the major roads in Catawba County.

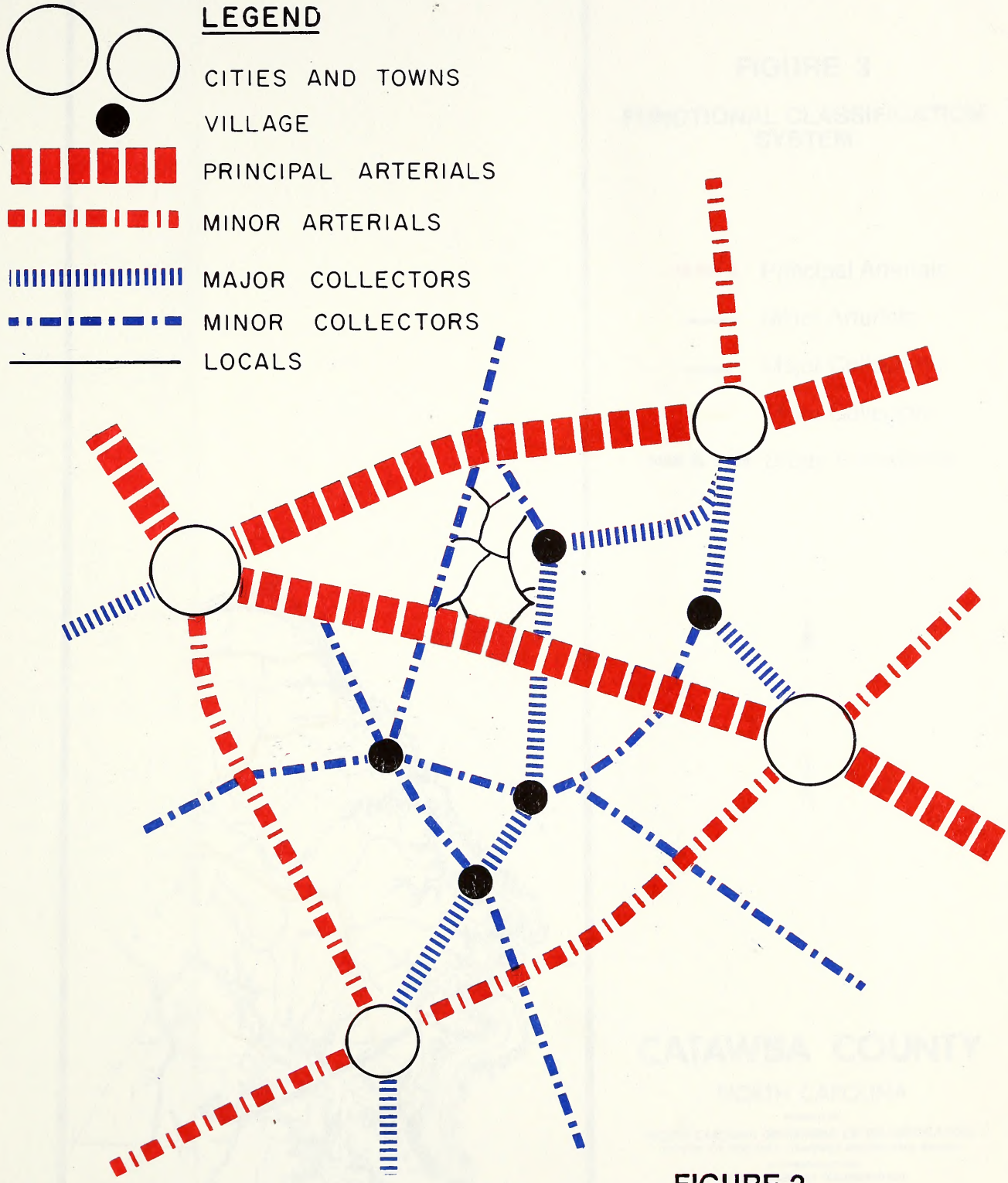


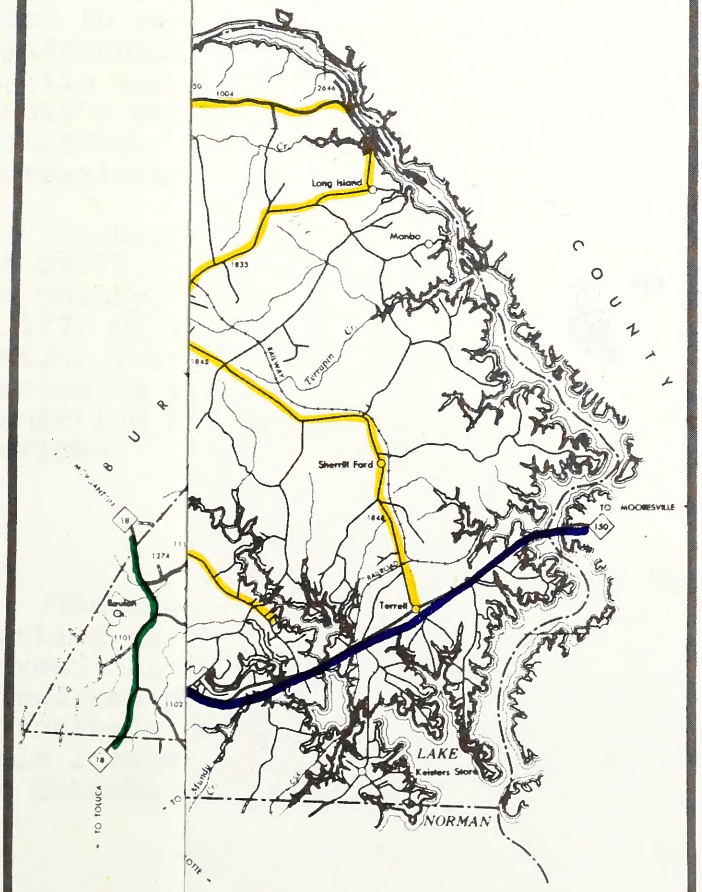

**FIGURE 2**

SCHEMATIC ILLUSTRATION
OF FUNCTIONALLY CLASSIFIED
RURAL HIGHWAY NETWORK

# FIGURE 3

## FUNCTIONAL CLASSIFICATION SYSTEM

- Principal Arterials
- Minor Arterials
- Major Collectors
- Minor Collectors
- Urban Boundaries



# CATAWBA COUNTY

NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS – PLANNING AND RESEARCH BRANCH

IN COOPERATION WITH THE

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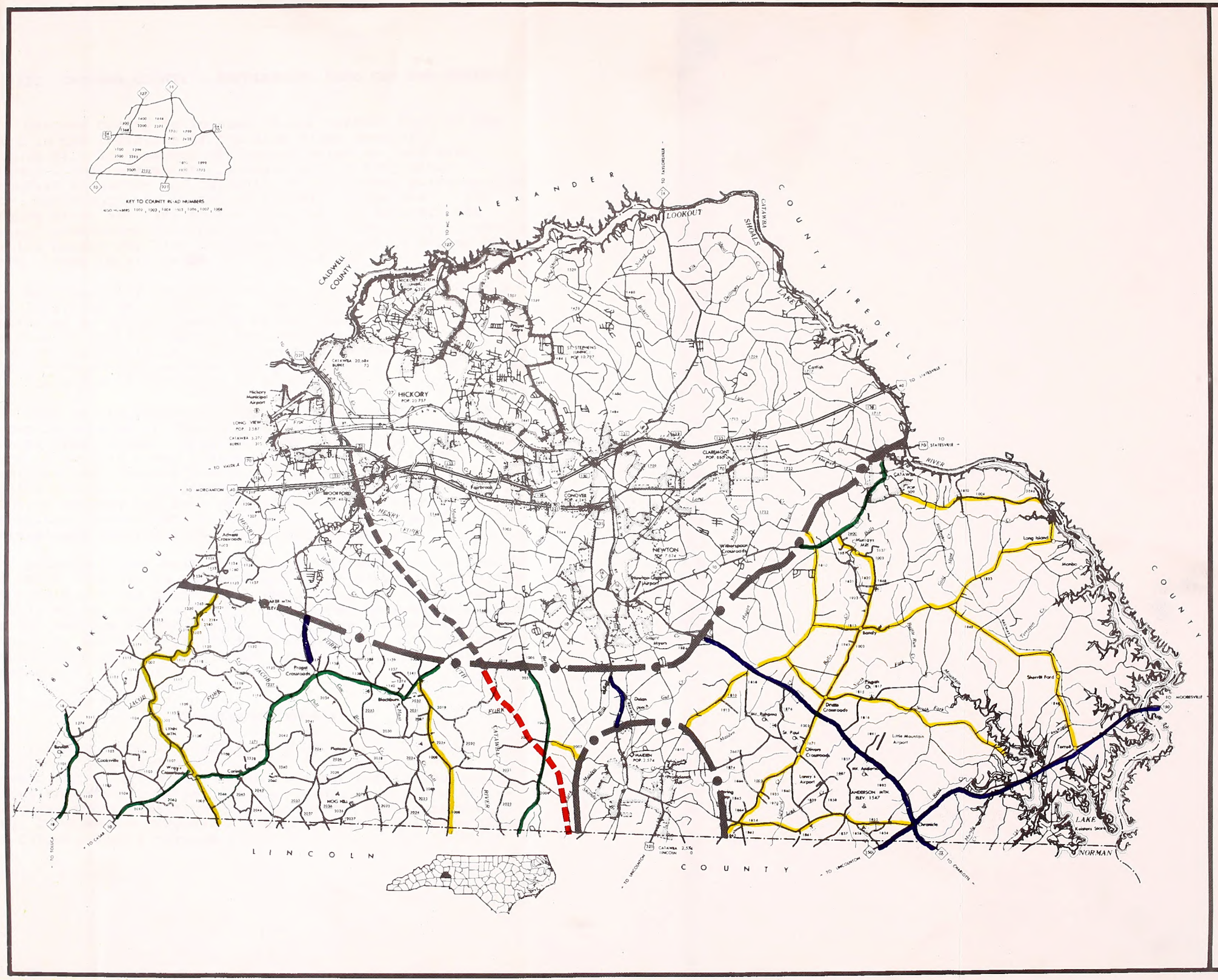
FEDERAL HIGHWAY ADMINISTRATION




# FIGURE 3

## FUNCTIONAL CLASSIFICATION SYSTEM

- Principal Arterials
- Minor Arterials
- Major Collectors
- Minor Collectors
- Urban Boundaries

# CATAWBA COUNTY

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SCALE 1 0 1 2 3 4 MILES

## III. CATAWBA COUNTY - POPULATION, LAND USE AND TRAFFIC

Catawba County is located in the western part of the state in the foothills of the Blue Ridge Mountains (Figure 4). It measures 406 square miles in land area. Catawba County shares its boundaries with five other counties: Alexander and Caldwell to the north, Burke to the west, Lincoln to the south and Iredell to the east. The Catawba River and Lake Norman serve as the northern and eastern boundaries for the county. The topography is gently rolling except for land immediately adjacent to stream beds where slopes in excess of 15% may be found.

Approximately two-third of the land in Catawba County was classified as rural area. The other one-third was considered as urban. Leading by the three larger cities in the County: Hickory, Newton and Conover, the urban area has expanded rapidly in the last couple of decades. In 1980, the Hickory-Newton-Conover area was designated as one of fifteen urbanize areas in the State of North Carolina .

Most of the industry, commercial and business in the County is located in the vicinity of the Hickory, Newton and Conover urban areas. However, major industries also can be found in smaller towns scatter through out the County. Traditionally, Catawba's economy was dominated by the textile and furniture industries. In recent years, the County's economy has been more diversified. Micro-technology, communication and services have became increasingly important in the County's economy.

Principal east-west arterials in Catawba County are I-40 and US 70. US 321 is the north-south principal arterial of the County. Major highways in the County are US 321, NC 150, NC 127, NC 18, NC 16 and NC 10. Southern Railway provides freight service to industries in the area. Commercial air service is available at the Hickory Municipal Airport where connecting flights to major air carriers and small cities are provided.

### Population Trends

The magnitude of traffic on a section of roadway is a function of the size and location of the population it serves. An analysis of past and present population trends allows the planner to project the future population and approximate the traffic which that growth will generate. Table 2 shows the historical and projected population trends for Catawba County through 2010.

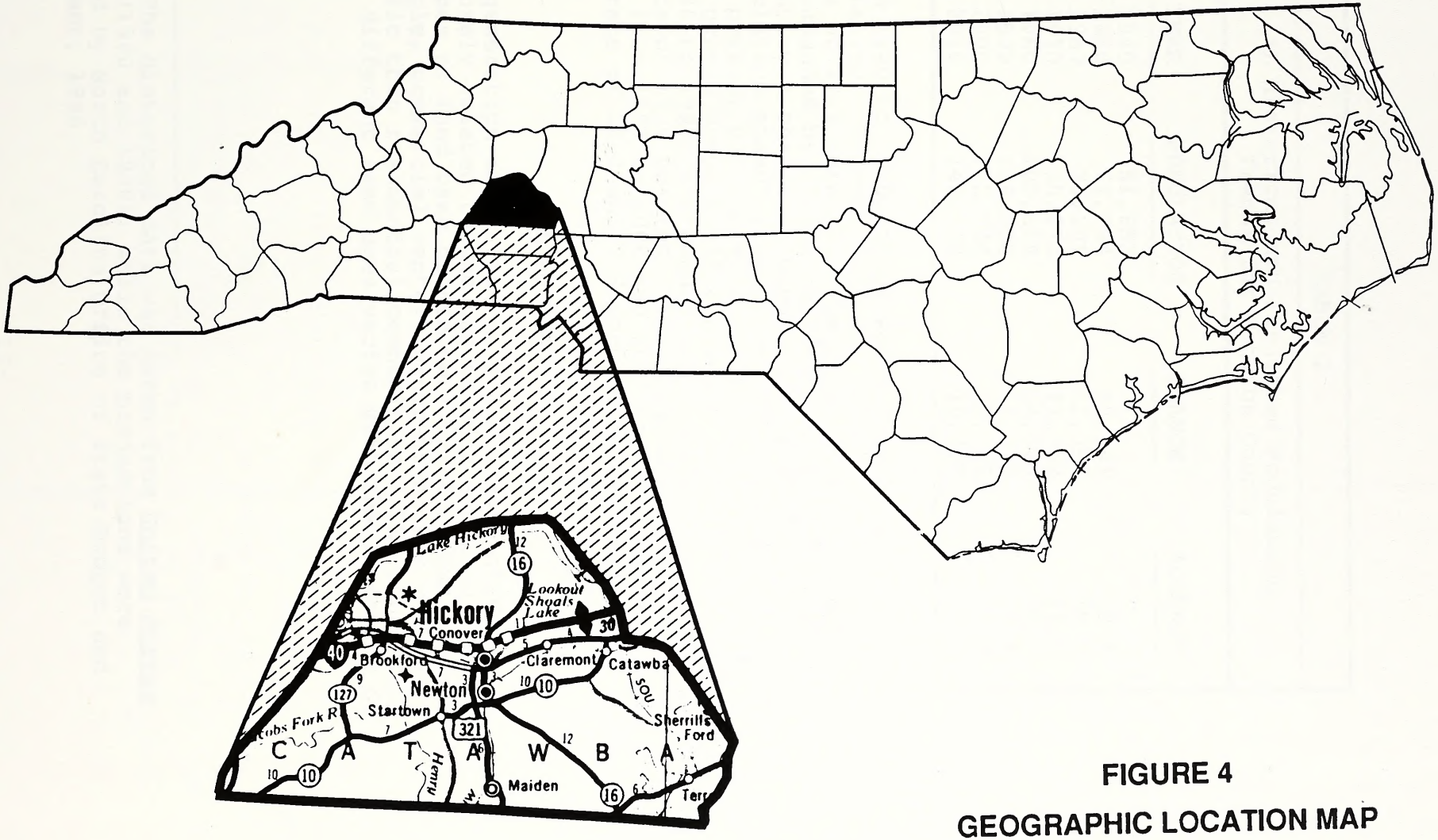



**FIGURE 4**

**GEOGRAPHIC LOCATION MAP**

| TABLE 2 | | | |
|---|---|---|---|
| (*) Historical and Projected Population Trends for Catawba County | | | |
| YEAR | POPULATION | CHANGE | %CHANGE |
| 1940 | 51,653 | | |
| 1950 | 61,794 | 10,141 | 19.6 |
| 1960 | 73,191 | 11,397 | 18.4 |
| 1970 | 90,873 | 17,682 | 24.2 |
| 1980 | 105,208 | 14,335 | 15.8 |
| 1990 | 119,832 | 14,624 | 13.9 |
| 2000 | 132,744 | 12,912 | 10.8 |
| 2010 | 143,144 | 10,400 | 7.8 |

From 1940 to 1950, there was a 19.6 percent increase in population. Between 1950 and 1960 there was an increase of 18.4 percent. The population of Catawba County expanded by 17,682 residents from 1960 to 1970 representing a change in population of 24.2 percent. The population steadily increases after the 1960 to 1970 growing period, but the rate of growth decreases. The rate of growth drops to 15.8 percent from 1970 to 1980. From 1980 to 1990, the population continues to increase at a rate of 13.9 percent. The projections for the periods from 1990 to 2000 and 2000 to 2010 show a growth rate of 10.8 and 7.8 percent respectively.

**Land Use**

The generation of traffic on a particular street is very closely related to the use of adjacent land areas. Some types of land uses create more traffic than others. An example, commercial centers generate higher volumes of traffic than residential communities. The attraction between different land uses varies with the intensity of

(*) The historical data was taken from United States Census (1960 and 1980); while the projections were provided by North Carolina Office of State Budget and Management, 1988.

development and the distance between those developed areas. Land uses must be designated by development type for transportation planning. By analyzing the distribution of land uses, a basis for forecasting future land use needs and the resulting travel patterns are established.

Land development in Catawba County is typical of that seen in many North Carolina counties. Higher density development occurs in and around metropolitan centers and along major travel corridors.

Currently, the majority of the residential growth is occurring in the vicinity of north Hickory, south of Newton and the Mountain View and Lake Norman areas. Future residential development is expect to follow the same path with additional development anticipated in the area between Maiden and the proposed US 321 Freeway.

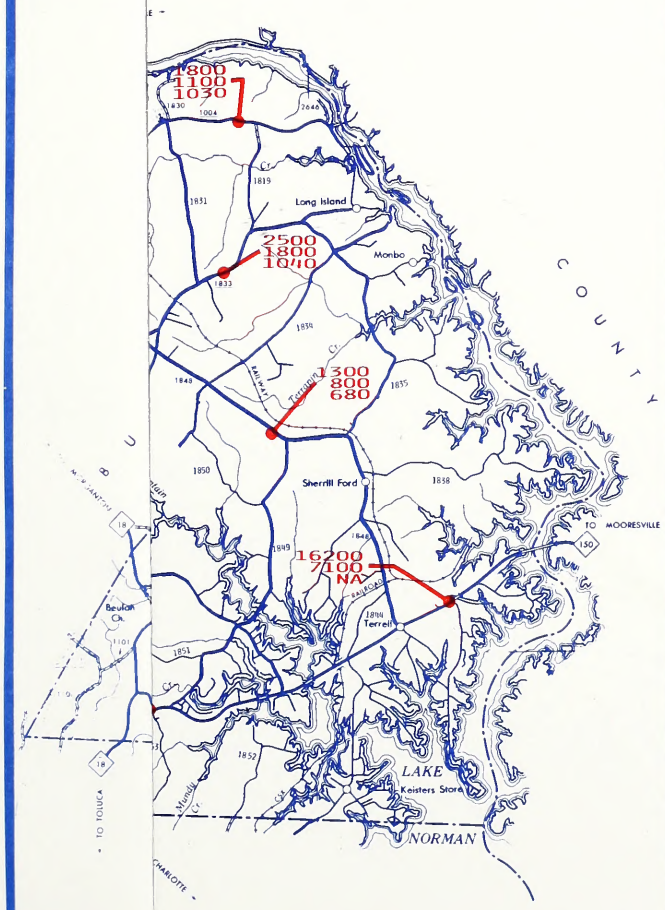
Major growth in commercial development is expected to continue along the stretch of US 70 between Hickory and Newton-Conover. Strip developments are expected to continue in the Mountain View area, along US 321 in Newton, NC 127 north of Hickory's CBD and along NC 150 in the Lake Norman area. Additional commercial development is anticipated to develop along the proposed Eastside Thoroughfare corridor, especially around the Spring Road and NC 127 intersections.

Currently, major industries are located in the Hickory, Newton and Conover urban areas. Growth is expected to continue in these area, especially in the Newton-Conover-Claremont triangle area. New industries are anticipated to develop along the proposed Eastside Thoroughfare in Hickory and the area between Maiden and the proposed US 321 Freeway.

## Traffic

A comparison of 1978 and 1989 average annual daily traffic volumes (ADT) on selected major roads and highways in Catawba County are shown in Figure 5. Also shown are projections for the year 2010, assuming no changes to the existing street system are made. These projections were based on historical and anticipated population and economic growth patterns and land use trends.

Motor vehicle registration for 1989, 1985, 1982 and 1978 is given in Table 3. Both automobile and truck registration suffered a dramatic decline from 1978 to 1982. This decline was the result of the gas crisis of the early eighties. From 1982 to 1985, registrations rebounded to level that existed in 1978. Truck and automobile registrations increased steadily from 1985 to 1989.



## FIGURE 5

HISTORICAL AND PROJECTED TRAVEL VOLUMES

LEGEND

| | |
|---|---|
| 2010 | 0000 |
| 1989 | 0000 |
| 1978 | 0000 |

# CATAWBA COUNTY

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FEDERAL HIGHWAY ADMINISTRATION

SCALE

1 0 1 2 3 4 MILES

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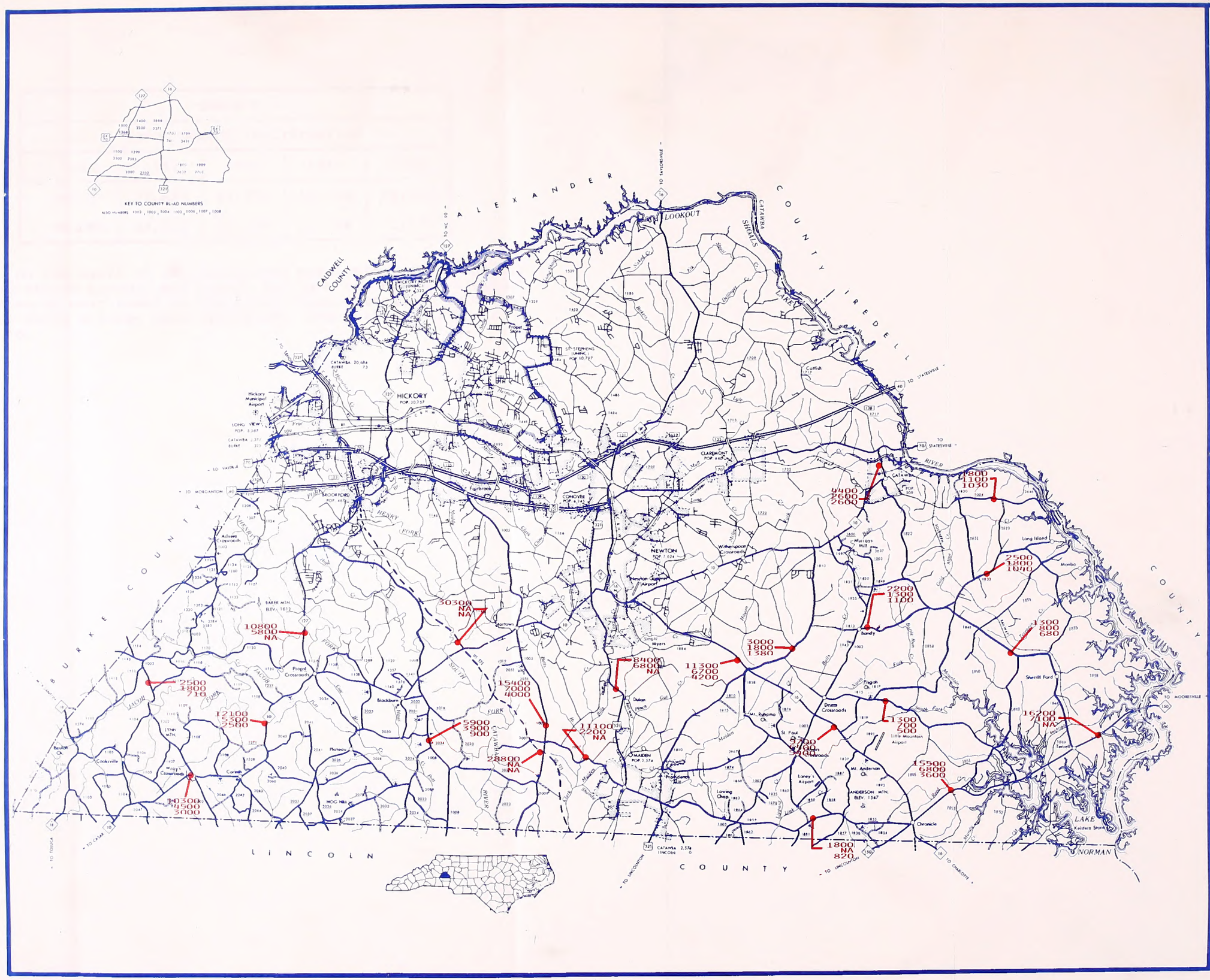


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# FIGURE 5

HISTORICAL AND PROJECTED TRAVEL VOLUMES

LEGEND

| | |
|---|---|
| 2010 | 0000 |
| 1989 | 0000 |
| 1978 | 0000 |

# CATAWBA COUNTY

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FEDERAL HIGHWAY ADMINISTRATION

SCALE

0 1 2 3 4 MILES

| TABLE 3 | | | | |
|---|---|---|---|---|
| MOTOR VEHICLE REGISTRATION | | | | |
| YEAR | 1989 | 1985 | 1982 | 1978 |
| AUTOS | 75,828 | 64,372 | 58,779 | 66,659 |
| TRUCKS | 28,659 | 22,205 | 19,706 | 21,507 |

On the basis of the forecasted population, motor vehicle registration trends, ADT trends and land use trends, traffic volumes on most roads in the county should steadily increase at an above average rate during the 1989-2010 planning period.

## IV. ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

### Capacity, Width and Alignment Deficiencies

Design requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each road or highway section must be individually analyzed and its design requirements determined by the amount and type of projected traffic, existing capacity, desired level of service, and available right of way.

The level of service is a function of the ease of movement experienced by motorists using the facility. The ability of a motorist to drive at a desired speed is dependent upon many factors. Included are the physical design of the road, the amount and character of traffic control devices, the influence and character of traffic generated by abutting property, and the imposed speed restrictions. The level of service is generally indicated by the overall travel speed experienced by traffic. Recommended minimum levels of service for roads and highways included in the proposed Catawba County Thoroughfare Plan are given in Table 4.

TABLE 4

**Minimum Levels of Service for Roads and Highways**

| Facility | Overall Travel Speed During Peak Travel Conditions |
|---|---|
| Major and Minor Arterials | 50-55 MPH |
| Major Collector Roads | 45-50 MPH |
| Minor Collector Roads | 40 MPH |

For driver convenience, ease of operations, and safety, it would be desirable to widen all existing roads and highways to provide a minimum lane width of 12 feet. However, when considering overall statewide needs and the available highway revenue, it is found that these levels of improvement applied statewide would be impractical. Therefore, it is necessary to establish minimum tolerable widths for existing roads with respect to traffic demands that would be economically feasible. The widths used in determining the existing lane deficiencies in the County are given in Table 5.

| TABLE 5 | | | |
|---|---|---|---|
| **Minimum Tolerable Lane Widths (in feet)** | | | |
| ADT | Principal Arterials | Minor Arterials | Collectors |
| over 2,000 | 11 | 11 | 11 |
| 400 - 2,000 | - | 10 | 10 |
| 100 - 400 | - | 10 | 9 |
| below 100 | - | - | 9 |

An analysis of roads in Catawba County's planning area was made to determine if the projected traffic (year 2010) would exceed the practical capacity of the system. The projected volumes are shown in Figure 5. Comparing the projected traffic to available capacities, it was anticipated that the following roads will be experiencing capacity related problems within the design period:

1. NC 150 from NC 16 to Iredell County.
2. NC 10 from Lincoln County to the proposed US 321 Freeway.
3. NC 16 from NC 150 to the Hickory-Newton-Conover Thoroughfare Plan boundary.
4. NC 127 from NC 10 to the Hickory-Newton-Conover Thoroughfare Plan boundary.
5. SR 1005 from NC 10 to Lincoln County.

There are a number of major roads in the County that have substandard widths. The standards established in Table 5 were used in the analysis. The width needed to bring these roads up to standard are given as the recommended cross section in the Thoroughfare Plan Street Tabulation and Recommendations in Appendix A. Because of the substantial cost of upgrading all secondary roads to standard, narrow widths may have to be tolerated until sufficient funds are available for improvements.

## Traffic Safety

Traffic accident records are of assistance in locating problem areas on the highway system. The Intersection Accident Listing for the period from January 1, 1989 to October 31, 1990 lists 7 intersections in Catawba County with five or more accidents (table 6). Those intersections with 15 or more accidents, or whose accident severity or property damage is considerably higher than the average, are called significant high accident locations. There is one significant high accident location in the Catawba County, at NC 127 and NC 10. Most of these accidents were caused by a vehicle in a left turn

movement. Since NC 127 and NC 10 both have separate left turning lanes, it is recommended that a protected left turn phase be added to the existing traffic signal. This "green arrow" would permit traffic to proceed safely through the intersection while the other vehicles are halted. Same improvement should be installed at the NC 16 and NC 150 intersection where 11 accidents occured in the 1989-90 period.

TABLE 6

**High Accident Locations in Catawba County**

| Intersection | Number of Accidents |
|---|---|
| NC 10 / NC 127 | 15 |
| NC 16 / NC 150 | 11 |
| NC 16 / SR 1003 | 9 |
| NC 127 / SR 1120 | 8 |
| NC 16 / SR 1810 | 7 |
| NC 150 / SR 1853 | 5 |
| SR 1003 / SR 1858 | 5 |

There is also a proposed intersection improvement at Shiloh Road (SR 1821) and Buffalo Shoals (SR 1003). The intersection will need to be realigned so that traffic from Buffalo Shoals will be routed onto Shiloh Road instead of going through Murrays Mill. This will help trucks and other vehicles avoid the almost 90-degree curve approaching the bridge at Murrays Mill.

Concurrent with the above intersection improvement, the bridge on Shiloh Road crossing Ball Creek will need to be replaced. This bridge currently is classified as functionally obsolete and will not be able to handle the rerouting truck traffic.

## Bridge Conditions

Bridges are a vital and unique element of a highway system. Financially speaking, bridges represent the most expensive element of a roadway system. The value of the total investment can be diminished by any inadequacies or deficiencies found in the bridge. Bridges represent the greatest opportunity of all potential highway failures for disruption of community welfare and for loss of human lives For these reasons, it is imperative that bridges be constructed to the same design standards as the system of which they are a part.

Congress enacted the National Bridge Inspection Program Standards on April 27, 1971, implementing the Federal Highway Act of 1968. These standards require that "all structures

defined as bridges located on any of the Federal-Aid Highway Systems be inspected and the safe load carrying capacity computed at regular intervals, not to exceed two years." A sufficiency index number has been calculated for each bridge to establish eligibility and priority for replacement. The bridges with the highest priority are replaced as Federal-Aid funds and State funds are made available.

The North Carolina DOT's Bridge Maintenance Unit, with assistance from various consultants, inspects all bridges of the State Highway System. All bridges in Catawba County have been analyzed, rated, appraised and inventoried. The resulting data has been reduced to a more readily useable form as a management tool.

A sufficiency rating was used in the analysis to determine the deficiency of each bridge. The sufficiency rating is a method of evaluating factors that determine whether a bridge is sufficient to remain in service. Factors used include: structural adequacy and safety, serviceability and functional obsolescence, essentiality for public use, type of structure, and traffic safety features. The result of this method is a percentage in which 100 percent represents an entirely sufficient bridge and zero percent represents an entirely insufficient or deficient bridge. A sufficiency rating of 50 percent or less qualifies for Federal Bridge Replacement Funds.

Table 7 shows the functionally obsolete bridges in Catawba County that have sufficiency ratings of 50 percent or less. Their locations are shown in Figure 6 in black. These bridges are also eligible for federal bridge replacement funds. The bridge with two stars by its Map Index number is the one that is recommended in this study to be added to the bridge replacement program.

TABLE 7

**Functionally Obsolete Bridges in Catawba County**

| Map Index | Sufficiency Rating | Bridge No. | Location |
|---|---|---|---|
| 1 | 48.1 | 10 | SR 1703 @ Elk Shoal Creek |
| 2 | 48.6 | 30 | SR 1124 @ US 70 |
| 3 | 39.3 | 34 | SR 1404 @ Falling Creek |
| 4 | 46.8 | 65 | SR 1105 @ Creek |
| 5 | 46.1 | 73 | SR 1002 @ Creek |
| 6 | 34.0 | 101 | SR 2043 @ Creek |
| 7 | 47.5 | 102 | SR 2042 @ Potts Creek |
| ** 8 | 47.1 | 153 | SR 1821 @ Balls Creek |

Table 8 shows structurally deficient bridges with sufficiency ratings of 50 percent or less. These bridges are eligible for federal bridge replacement funds. The locations of these bridges are shown in red on Figure 6.

TABLE 8

**Structurally Deficient Bridges in Catawba County**

| Map Index | Sufficiency Rating | Bridge No. | Location |
|---|---|---|---|
| 1 | 34.8 | 8 | SR 1706 @ Creek |
| 2 | 46.9 | 9 | SR 1700 @ Elk Shoal Creek |
| 3 | 29.0 | 13 | SR 1486 @ Baker Creek |
| 4 | 12.3 | 21 | SR 1484 @ Lyle Creek |
| 5 | 40.2 | 27 | SR 1529 @ Long Shoal Cr. |
| * 6 | 45.6 | 29 | NC 127 @ Jacob Fork River |
| * 7 | 30.8 | 37 | US 321 @ Norfolk&South RR |
| 8 | 29.5 | 40 | SR 1124 @ Creek |
| 9 | 43.3 | 43 | SR 1131 @ Hop Creek |
| 10 | 10.3 | 50 | NC 127 @ Henry Fork River |
| 11 | 42.7 | 51 | SR 1146 @ Muddy Creek |
| 12 | 9.3 | 53 | SR 1143 @ Henry River |
| 13 | 10.4 | 54 | SR 1008 @ Jacob Fork Riv. |
| 14 | 46.5 | 70 | SR 1111 @ Creek |
| 15 | 20.2 | 79 | SR 1156 @ Anthony Creek |
| 16 | 33.3 | 82 | SR 1165 @ Clark Creek |
| 17 | 38.2 | 83 | SR 1149 @ Clark Creek |
| 18 | 43.9 | 90 | SR 1727 @ Hagan Creek |
| 19 | 22.9 | 94 | SR 1722 @ Mclin Creek |
| 20 | 39.5 | 100 | SR 2036 @ Potts Creek |
| 21 | 19.6 | 105 | SR 2025 @ Creek |
| * 22 | 18.7 | 115 | SR 2007 @ Maiden Creek |
| * 23 | 37.4 | 116 | SR 2007 @ Clark Creek |
| 24 | 43.0 | 120 | SR 2012 @ Clark Creek |
| 25 | 46.6 | 122 | SR 1807 @ Hagan Fork Cr. |
| 26 | 33.8 | 127 | SR 1880 @ Pinch Gut Creek |
| 27 | 21.3 | 139 | NC 16 @ Catawba River |
| * 28 | 8.8 | 141 | NC 10 @ Lyle Creek |
| * 29 | 32.5 | 152 | SR 1003 @ Balls Creek |
| 30 | 44.0 | 157 | SR 1813 @ Battle Run Cr. |
| 31 | 32.5 | 240 | SR 1858 @ Maiden Creek |

* Included in the 1990-97 North Carolina Transportation Improvement Program.

** Recommend to be added to North Carolina Transportation Improvement Program.

Below is the list of the bridges that are included in the current (1990-97) Transportation Improvement Program:

- US 321 over Carolina & Northwestern RR (Bridge # 37)
- NC 10 over Carolina & Northwestern RR (Bridge # 113)
- NC 10 over Lyle Creek (Bridge # 141)
- NC 16 over Lyle Creek (Bridge # 97)
- NC 16 over Baker Creek (Bridge # 111)
- NC 18 over Whitener Creek (Bridge # 48)
- NC 18 over Jacob Fork River (Bridge # 11)
- NC 127 over Jacob Fork River (Bridge # 29)
- SR 1003 over Balls Creek (Bridge # 152)
- SR 2007 over Clark Creek (Bridge # 115, 116)

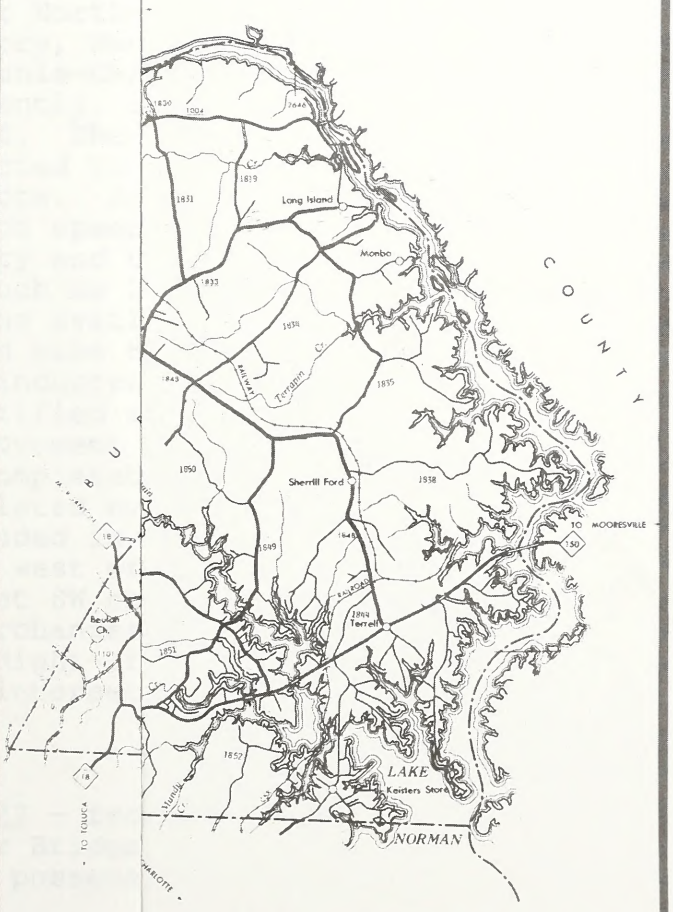


FIGURE 6

BRIDGE CLASSIFICATION

**FUNCTIONALLY OBSOLETE BRIDGES**

**STRUCTURALLY DEFICIENT BRIDGES**

# CATAWBA COUNTY

## NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS—PLANNING AND RESEARCH BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

1 0 1 2 3 4 MILES

Below is the list of the bridges that are included in the current (1990-97) Transportation Improvement Program:

- US 321 over Carolina & Northwestern RR (Bridge # 37)
- NC 10 over Carolina & Northwestern RR (Bridge # 113)
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- NC 16 over Baker Creek (Bridge # 111)
- NC 18 over Whitener Creek (Bridge # 48)
- NC 18 over Jacob Fork River (Bridge # 11)
- NC 127 over Jacob Fork River (Bridge # 29)
- SR 1003 over Balls Creek (Bridge # 152)
- SR 2007 over Clark Creek (Bridge # 115, 116)

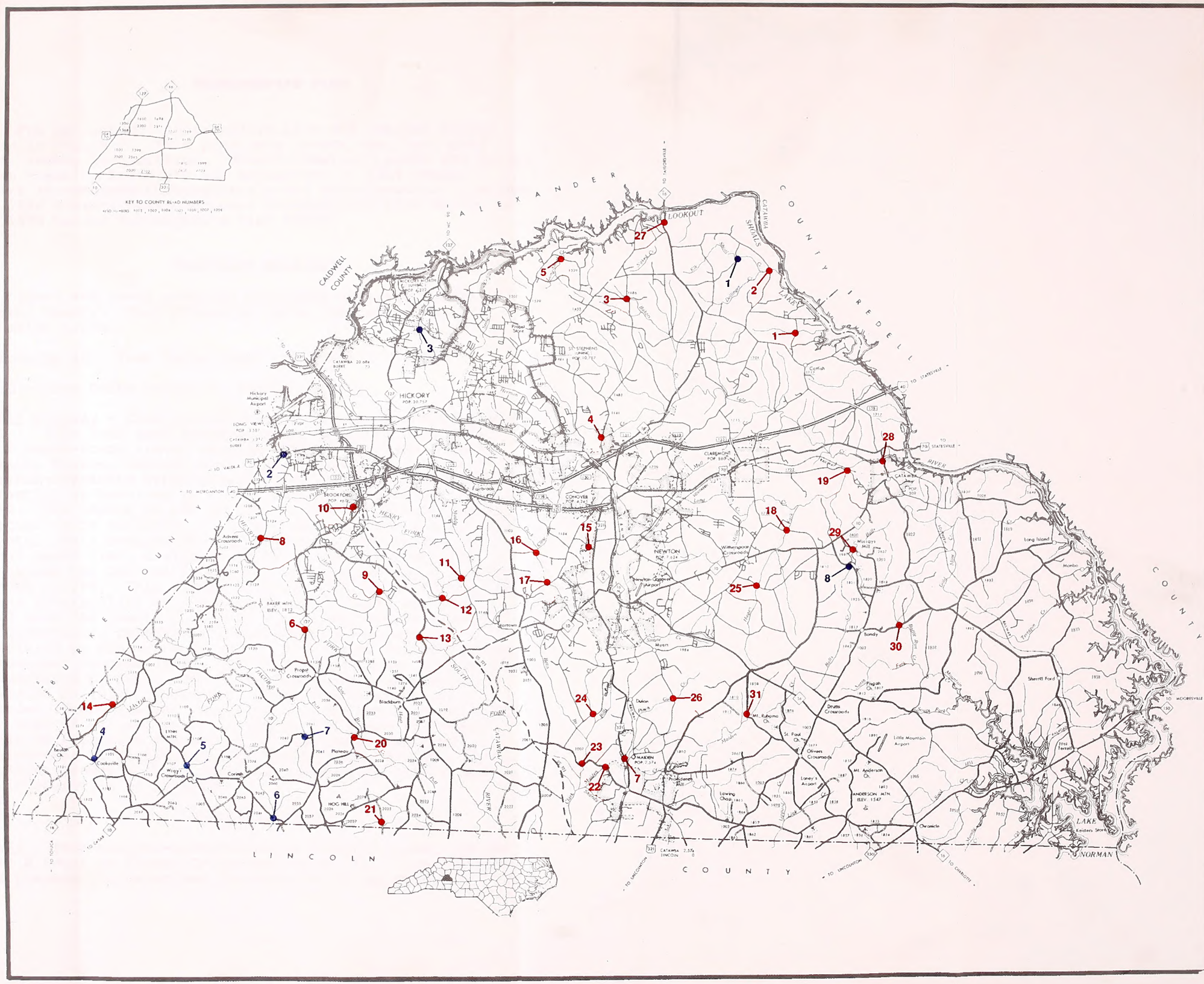


FIGURE 6
BRIDGE CLASSIFICATION

FUNCTIONALLY OBSOLETE BRIDGES

STRUCTURALLY DEFICIENT BRIDGES

# CATAWBA COUNTY

## NORTH CAROLINA

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE
0 1 2 3 4 MILES

## V. THOROUGHFARE PLAN

The recommended thoroughfare plan for Catawba County is shown in Figure 7. This plan only covers the rural area under county jurisdiction. Hickory-Newton-Conover and Maiden Urban Planning Areas are not emphasized in this report. Theirs recommended thoroughfare plans are discussed in either the 1986 Hickory-Newton-Conover Thoroughfare Plan Report or the 1989 Maiden Thoroughfare Plan Report .

### Principal Arterial

There are three existing principal arterial routes in Catawba County. They primarily serve interstate and statewide travel:

Interstate 40 - from Burke County to Iredell County.

US 70 - from Burke County to Iredell County

US 321 Freeway - from Lincoln County Line to Hickory Planning Limit. This four lane freeway, when complete, will be a major North-South travel service freeway that links the Hickory, Newton, Conover and Lenoir urban areas to the Gastonia-Charlotte Urban Areas. Most of this traffic, currently, is serviced by either the existing US 321 or NC 16. The impact of the US 321 freeway on Catawba county is expected to be extensive in both transportation and economic aspects. As a control of access freeway and probably a 65 mph speed limit designation, travel time between the county and the Charlotte-Gastonia urban areas could reduce by at much as 25%. This factor together with other factors such as the availability of fresh water and cheaper raw land, would make the county to become a more attractive area for new industrial, commercial and residential growth. Identified as project R-85 in the 1991-97 NC Transportation Improvement Program (TIP), US 321 freeway is not scheduled to be completed by 1997. The Right-Of-Way is scheduled to be completed by 1994. Currently, three interchanges are included in the design. They are at Startown Road (SR 1005) just west of Maiden, at NC 10 and at the proposed Second Street SW extension just south of Brookford. Another interchanges at SR 1144 will be added to the design. Also the Right-Of-Way will be reserved for another interchange at the intersection of SR 1143.

### Minor Arterial

NC 127 - from Hickory-Newton-Conover Planning Limit (Jacob River Bridge) to Propst Crossroads at NC 10. This corridor will possess the urbanized characteristics as strip

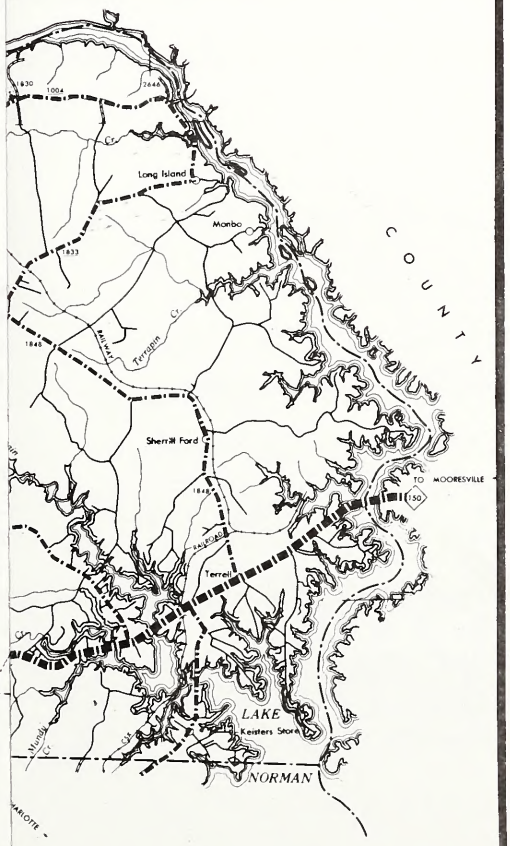
| LEGEND | | |
|---|---|---|
| HIGHWAY CLASSIFICATIONS | EXISTING | PROPOSED |
| PRINCIPAL ARTERIALS Interstate | | |
| Other | | |
| MINOR ARTERIALS | | |
| MAJOR COLLECTORS | | |
| MINOR COLLECTORS | | |
| URBAN MAJOR THOROUGHFARE | | |
| URBAN THOROUGHFARE PLANNING BOUNDARY | | |

**ADOPTED BY:**
CATAWBA COUNTY AUGUST 19, 1991

**RECOMMENDED FOR APPROVAL BY:**
NC DEPARTMENT OF TRANSPORTATION
PLANNING AND ENVIRONMENTAL BRANCH AUGUST 21, 1991

**ADOPTED BY:**
NC DEPARTMENT OF TRANSPORTATION SEPTEMBER 6, 1991

**PUBLIC HEARING:**
CATAWBA COUNTY APRIL 16, 1991



RECOMMENDED
THOROUGHFARE PLAN

# CATAWBA COUNTY

## NORTH CAROLINA

PREPARED BY THE

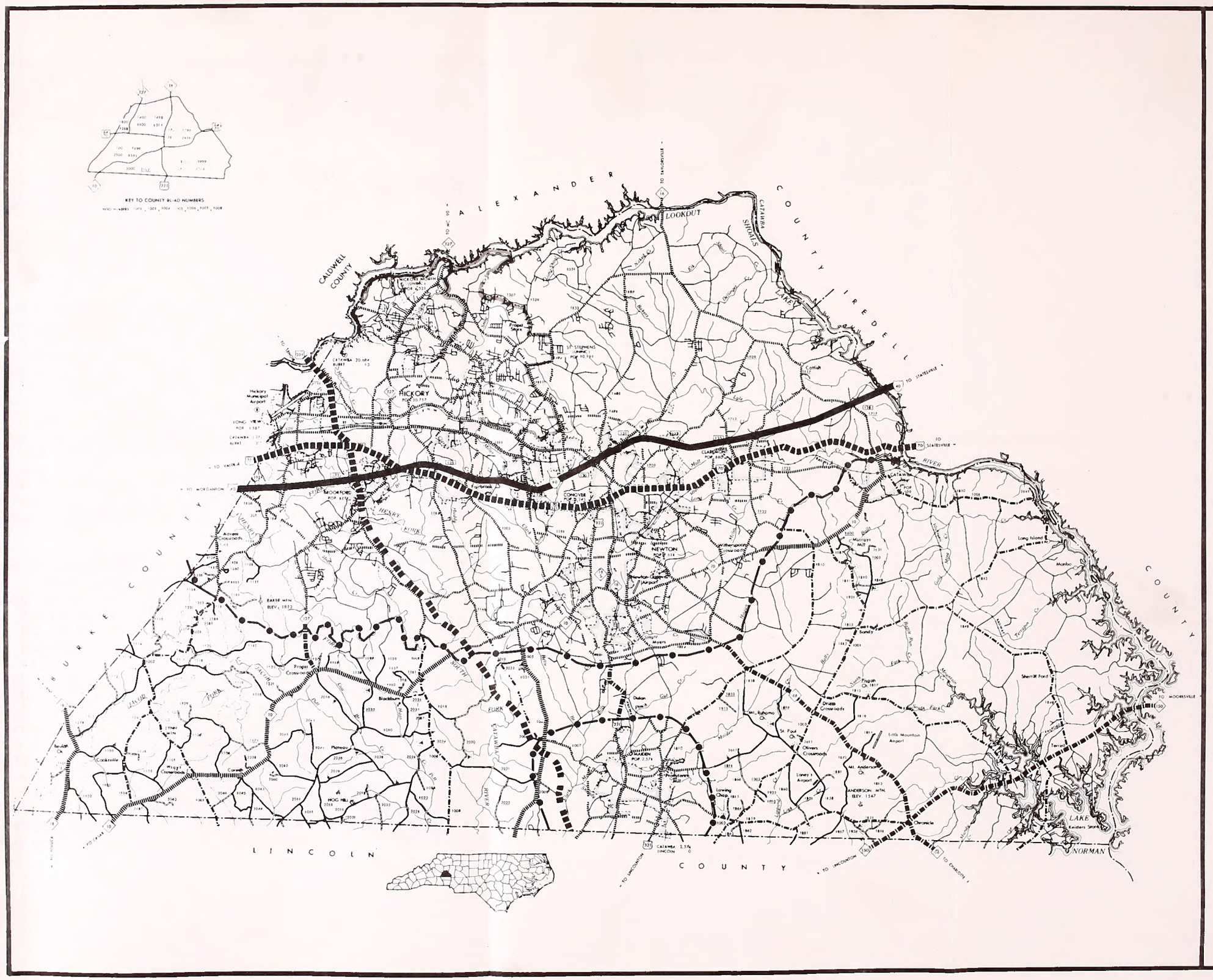
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS — PLANNING AND RESEARCH BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

**JULY 3, 1991**

SCALE 1 0 1 2 3 4 MILES




| LEGEND | | |
|---|---|---|
| HIGHWAY CLASSIFICATIONS | EXISTING | PROPOSED |
| PRINCIPAL ARTERIALS Interstate | | |
| Other | | |
| MINOR ARTERIALS | | |
| MAJOR COLLECTORS | | |
| MINOR COLLECTORS | | |
| URBAN MAJOR THOROUGHFARE | | |
| URBAN THOROUGHFARE PLANNING BOUNDARY | | |

ADOPTED BY:
CATAWBA COUNTY AUGUST 19, 1991

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RECOMMENDED
THOROUGHFARE PLAN

# CATAWBA COUNTY

## NORTH CAROLINA

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JULY 3, 1991

SCALE 0 1 2 3 4 MILES

commercial development is continuing to spread southward from the Mountain View area. The traffic on this section of NC 127 will reach beyond the highway's practical limit by the year 2010. It is recommended that the four-laning of NC 127 in the Hickory-Newton-Conover Urban Area continues southward to NC 10 .

US 321 - from Maiden to Newton Planning Limit. As a major connector between Newton and Maiden urban areas, this minor arterial has already possessed some urbanized characteristics. The traffic on this section will reach the practical limit by the end of the planning period. It is recommended that this section of US 321 to be widen 24 feet with left turn provision at key intersections.

NC 150 - from Lincoln County Line to Iredell County Line. NC 150 is currently classified as a major collector. Due to the type of trip it serves, it is recommended that this highway be reclassified to a minor arterial. The traffic volume on this east-west highway is expected to growth at a fast pace in the next 20 years. This is due to the high potential growth in the Lake Norman area and the through traffic increase induced by the completion of US 321 freeway. Currently, NC 150 is programed to be widened to a multi-lane facility in the 1990-97 NC Transportation Improvement Program (project number R-2307). It is a 22.6 miles project starting from NC 27 in Lincolnton to I-77 just west of Mooresville. The Right-Of-Way is scheduled to be acquired on the end of FY 1994. Construction would be started on the end of FY 1996.

NC 16 - from Hickory-Newton-Conover planning limit to Lincoln County Line. This north-south highway functions as a valuable link to the Charlotte Urban area, and it will continue to do so even after the proposed US 321 is completed. NC 16 is currently classified as a major collector. However, due to the characteristic of the areas and type of trip it serves, it is recommended that this highway be reclassified to a minor arterial. Existing travel pressure on this section of NC 16 will reach beyond the practical limit as a two lanes highway. A bypass is currently programed in the 1990-97 NCTIP (R-2206). It is a 4 lane divided facility on new location from the existing Killian Crossroad to Lucia in Gaston county. Additional improvement will be needed on the section north of Killian Crossroad. It is recommended that this section of NC 16 to be widened to a hybrid four lane divided urban boulevard where the grass shoulder will replace the curb and gutter. The shoulder will be specialized to minimize the right-of-way to 150 feet.

## Collector Road System

Rural collector routes service intra-county travel. Major collector roads supplement the arterial system by providing an interconnecting network between smaller population centers and the arterial routes. Minor collectors collect traffic from the local roads and carry it to higher system facility. The major and minor collector roads in Catawba County are listed below.

### Major Collector

NC 18 - From Burke County to Lincoln County

NC 10 - From Lincoln County Line To US 70. This east-west highway runs through a number of small rural communities, collects the traffic and disburses them onto the principal and minor arterials in the county. Part of this east-west highway lies in the Hickory-Newton-Conover thoroughfare planning area. For more information on this section see appendix or the 1986 Hickory-Newton-Conover Thoroughfare Plan Report. On the west section of the route (between Lincoln county and US 321), capacity problems would be experienced by the end of the planning period. It is recommended that the highway be widened to 24 feet with left turn provisions at key intersections. No improvement will be needed for the east section of NC 10 (between the Hickory-Newton-Conover Planning Area boundary to US 70).

SR 1005 (Startown Road) - from Lincoln County Line to Hickory Planning Limit. Currently, this major collector operates at a satisfactory level of service (LOS). However, by the later year of the planning period, the LOS will be worsen, especially in the section north of the US 321 interchange where the new industrial and residential growths is anticipated. The increase in future travel between southern Newton and US 321 via Startown Road is another factor that erodes the road's LOS. It is recommended that the route to be widened to 24 feet with adequate left turn provisions at key intersections. This improvement couple with the extension of the Robinson Road (see Robinson Road Extension in minor collector section) will be sufficient to maintain the present LOS to the year of 2010.

### Minor Collector

SR 1146 (Robinson Road Extension) - from NC 10 to West Maiden Road (SR 2007). This 2-lane route was proposed for two reasons, providing continuity and capacity. This route, when complete, will provide the missing link for a continuous

travel between the Valley Hills shopping areas in Hickory and the resort community of Lake Norman via West Maiden Road (SR 2007). The route also will provide the additional capacity to disburse the traffic that generates from the anticipated new growths in the area between Maiden and US 321. Without this extension, Startown Road will be overloaded.

SR 2007 (West Maiden Road) - from Maiden Planning Limits to SR 1005 (Startown Road). This section of West Maiden Road is a part of a project that is currently in the 1991-97 NCTIP (R-2623). The project, from US 321A to US 321 freeway, called for widening the existing road to 28 feet and realignment at 2 locations. This improvement will complement the proposed Robinson Road Extension to provide a continuous travel from Hickory to the lake area. For more in formation on this route, see the 1989 Maiden Thoroughfare Plan Report.

The following roads are the other minor collectors that will need minor widening for safety reasons. Most of these roads are only 18 feet in cross section. It is recommended that these roads to be widened to the minimum tolerable lane widths (Table 5) when fund is available.

SR 1002 (Old Shelby, Rhoney Farm, Catsquare Road)

SR 1004 (Rhyne-Huson Chapel Road)

SR 1008 (Hickory-Lincolnton Road)

SR 1722 (Old Catawba Road)

SR 1810 (Ball's Creek Road)

SR 1813 (Bandy Crossroad)

SR 1815 (Little Mountain Road)

SR 1833 (Long Island Road)

SR 1848 (Sherrill Ford Road)

SR 1855 (East Maiden Road)

SR 1874 (Water Plant Road)

## VI. IMPROVEMENT PRIORITIES

The improvements to the Catawba County Thoroughfare Plan obviously cannot be undertaken all at once, nor should they be. The cost would be overwhelming and the need for many of the improvements is not immediate. In an effort to reflect the relative value of various improvements, an assessment has been made of the benefits that can be expected from each project and a comparison has been made to the projected costs involved. The result of this benefit-cost analysis is the development of a listing of priorities for those recommended improvements.

Priorities have been set by comparing the benefits that will result to the expected project costs. Three principal measures of benefits were used: road user cost savings, the potential for increased economic development resulting from the improvement, and the environmental impact, both positive or negative, which might result. The first measure is an actual estimate of dollar savings, while the others are estimates of the probability of the resulting change.

Reduced road user costs should result from any roadway improvement, from a simple widening to the construction of a new roadway to relieve congested or unsafe conditions. Comparisons of the existing and the proposed facility have been made in terms of vehicle operating costs, travel time costs, and accident costs. These user benefits are computed as total dollar savings over the 20 year design period using data such as project length, base year and design year traffic volumes, traffic speed, type of facility, and volume/capacity ratio.

The impact of a project on economic development potential is denoted as the probability that it will stimulate the economic development of an area by providing access to developable land and reducing transportation costs. It is a subjective estimate based on the knowledge of the proposed project, local development characteristics, and land development potential. The probability is rated on a scale from 0 (none) to 1.00 (excellent).

The environmental impact analysis considers the effect of a project on the physical, social/cultural, and economic environment. Table 9 lists the items that are considered when evaluating the impact on the environment. Many of these have been accounted for in evaluating the project with respect to user benefits, cost, and economic development potential. However, thirteen environmental factors are generally not considered in these evaluations. They are the environmental impacts of a project on: (1) air quality, (2) water resources, (3) soils and geology, (4) wildlife, (5) vegetation, (6) neighborhoods, (7) noise, (8) educational facilities, (9) churches, (10) parks and recreational facilities, (11) historic sites and landmarks, and (12) public health and safety.

The summation of both positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impact of a project.

| TABLE 9 |
| --- |
| **Environmental Considerations** |
| Physical Environment |
| Air quality |
| Water Resources |
| Soils and Geology |
| Wildlife |
| Vegetation |
| Social and Cultural Environment |
| Housing |
| Neighborhoods |
| Noise |
| Educational Facilities |
| Churches |
| Parks and Recreational Facilities |
| Public Health and Safety |
| National Defense |
| Aesthetics |
| Economic Environment |
| Businesses |
| Employment |
| Economic Development |
| Public Utilities |
| Transportation Costs |
| Capital Costs |
| Operation and Maintenance Costs |

Offsetting the benefits that would be derived from any project is the cost of its construction. A new facility, despite its high projected benefits, might prove to be unjustified due to the excessive costs involved in construction. The highway costs estimated in this report are based on the average statewide construction costs for similar project types. An estimate of anticipated right-of-way costs is also included. Table 10 evaluates the proposed Catawba County projects with respect to user benefits, estimated costs, probability of economic development, and environmental impact.

To guide both the state and the County in their efforts to implement the improvements recommended in this report, the proposed projects have been placed into two priority groups in order of probable need. These priorities are shown in Table 11. Since conditions are constantly changing with time, these priorities should be periodically reevaluated by the County and the Division Engineer. Other roadway improvements, which can be identified from Appendix A, are considered to be low priority projects.

TABLE 10

Benefits Evaluation of Selected Projects in Catawba County

| Project | Length (Mile) | User Benefit ($000) | Cost ($000) | Econ Dev Poten. Prob. | Envir. Impact Prob. | Thru ADT |
|---|---|---|---|---|---|---|
| US 321. Widen to 24 feet (fr. Hickory-Newton-Conover to Maiden Urban Boundary.) | 1.67 | 1,113<br>404/Mi | 439 | 0.75 | +0.00<br>-0.00 | M |
| NC 16. Widen to 4 lane Blvd. (fr. Hickory-Newton-Conover urban boundary to Killian Crossroad.) | 8.10 | 14,046<br>683/Mi | 8,510 | 0.70 | +0.30<br>-0.10 | M |
| NC 127. Widen to 4 lane urban (fr. Hickory-Newton-Conover uraban boundary to NC 10.) | 1.20 | 4,101<br>2,178/Mi | 1,490 | 0.70 | +0.20 | M |
| West Maiden Street (SR 2007) Widen to 28 feet. (fr. US 321A to Startown Rd.) | 2.30 | 7,315<br>2,231/Mi | 2,184 | 0.85 | +0.20<br>-0.00 | L |
| NC 10 West, widen to 24 feet (fr. Lincoln County to US 321) | 12.84 | 28,040<br>1,849/Mi | 4,202 | 0.65 | +0.10<br>-0.00 | M |
| Startown Road (SR 2007). Widen to 24 feet. (fr. Lincoln Co. to Hickory-Newton-Conover Urban Area) | 6.10 | 10,193<br>1,329/Mi | 2,085 | 0.70 | +0.10<br>-0.00 | L |
| Robinson Road Extension. proposed 2-lane rural. (fr. NC 10 to Startown Rd.) | 3.64 | 27,351<br>6,462/Mi | 3,830 | 0.75 | +0.10<br>-0.10 | L |

| TABLE 11 | | | | |
|---|---|---|---|---|
| Construction Priorities and Cost Estimates | | | | |
| Project | Recommended X-Section | Construction Cost (1000's) | Right-of-Way Cost (1000's) | Total Cost (1000's) |
| FIRST PRIORITY | | | | |
| W. Maiden Rd. (SR 2007) | L | 2,120 | 64 | 2,184 |
| US 321 | L | 439 | - | 439 |
| NC 127 | H | 1,200 | 290 | 1,490 |
| NC 16 | G | 7,290 | 1,220 | 8,510 |
| NC 10 West | L | 3,604 | 598 | 4,202 |
| Startown Rd. (SR 1005) | L | 1,787 | 298 | 2,085 |
| Robinson Rd. EXT | L | 3,600 | 230 | 3,830 |
| SECOND PRIORITY | | | | |
| E. Maiden Rd. (SR 1855) | L | 1,641 | - | 1,641 |
| SR 1008 | L | 1,641 | - | 1,641 |
| SR 1821 | L | 703 | - | 703 |
| SR 1810 | L | 2,549 | - | 2,549 |

## VII. IMPLEMENTATION

There are several tools available for use by the County to assist in the implementation of a thoroughfare plan. They are as follows:

### State-County Adoption of Thoroughfare Plan

If requested, the North Carolina Department of Transportation, in cooperation with the County, will develop and mutually approve a County Thoroughfare Plan. The mutually approved plan would serve as a guide to the Department of Transportation in the development of the road and highway system for the County. The approval and enforcement of this plan by the local government will enable standard road regulations and land use controls to be used effectively in the implementation of the plan.

### Subdivision Controls

The subdivision regulations require every subdivider to submit a plan of the proposed subdivision to the county planning commission. It also sets certain standards to which subdivisions can be constructed. Through this process, it is possible to require the subdivision streets to conform to the thoroughfare plan and to reserve or protect necessary rights-of-way for projected roads and highways that are to become a part of the thoroughfare plan. The construction of subdivision streets to adequate standards would reduce maintenance costs and simplify the transfer of the streets to the State Highway System. Appendix B outlines the recommended design standards.

### Land Use Controls

Land use regulations are an important tool in that they regulate future land development and minimize undesirable development along roads and highways. The land use regulatory system can improve highway safety by requiring sufficient setbacks to provide for adequate sight distances and by requiring off-street parking.

### Funding

The majority of the improvements are scheduled and funded by the Transportation Improvement Program (TIP). The Board of Transportation regularly conducts public meetings to obtain input from the public pertaining to their needs for highway improvements.

However, all roadway improvements are not covered in the TIP. Nearly all secondary road work is done on a county by county basis. These funds, known as the county construction account, are used to pave unimproved roads, widen roadways, stabilize dirt roads, make minor alignment improvements, and even construct short connectors when appropriate. The County Commissioners are encouraged to work with the Division Engineer when the priority list is developed for the county. Many of the minor improvements recommended may be realized by using construction account funds allotted to the county and developing a priority list for the county in conjunction with the Division Engineer.

# *APPENDICES*

## APPENDIX A

### Typical Cross Sections

Typical cross sections recommended by the Thoroughfare Planning Unit are shown in Figure 8, and listed in Table A1.

Cross section "A" is illustrative for controlled access freeways. The 46 foot grassed median is the minimum median width. Wider variations could result depending upon design considerations. Slopes of 8:1 into 3 foot drainage ditches are desirable for traffic safety. Right-of-way requirements would typically vary upward from 250 feet depending upon cut and fill requirements.

Cross section "B" is typical for four lane divided highways in rural areas which may have only partial or no control of access. The minimum median width for this cross section is 30 feet, but a wider median is desirable. Design requirements for slopes and drainage would be similar to cross section "A", but there may be some variation from this depending upon right-of-way constraints.

Cross section "C", seven lane urban, and cross section "D", five lane urban, are typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "E" and "F" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections.

Cross section "G" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 24 feet is recommended with 30 feet being desirable.

Typical cross section "H" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes, but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane probably would be required at major intersections.

Thoroughfares which are proposed to function as one-way traffic carriers would typically require cross section "I". Cross section "J" and "K" are usually recommended for minor thoroughfares since these facilities usually serve both land service and traffic service functions. Cross section "J" would be used on those minor thoroughfares where parking on both sides is needed as a result of more concentrated development.

Cross section "L" is used in rural areas or for staged construction of a wider multilane cross section. On some thoroughfares projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time.

The curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to move the sidewalk further away from the street to provide added separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

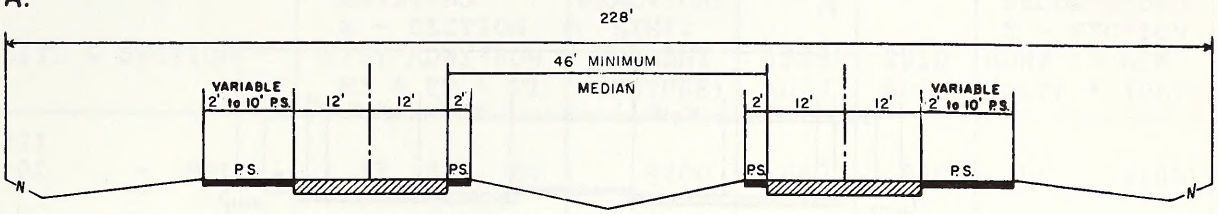
Rights-of-way shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle traffic along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to allow for the bicycle facilities. The North Carolina Bicycle Facility and Program Handbook should be consulted for design standards for bicycle facilities.

Recommended typical cross sections for thoroughfares were derived on the basis of projected traffic, existing capacities, desirable levels of service and available right-of-way.

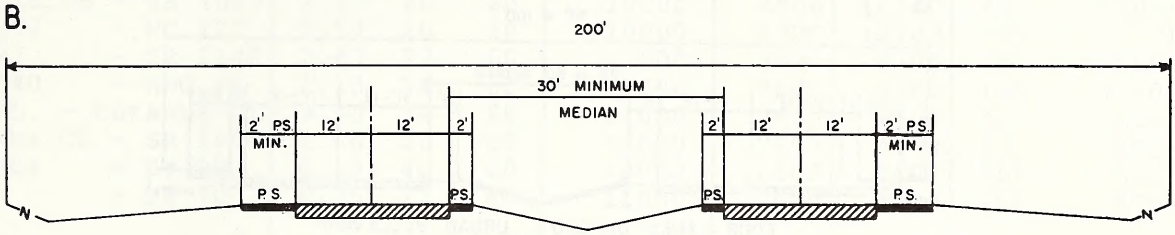
# TYPICAL THOROUGHFARE CROSS SECTIONS

A.



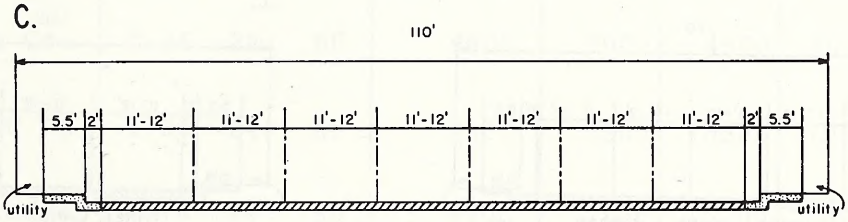

FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



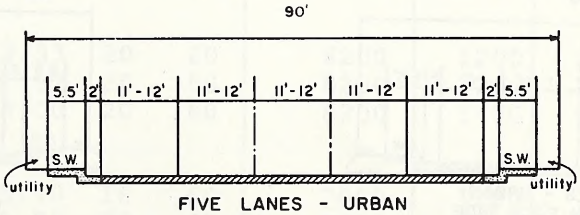

FOUR LANES DIVIDED WITH MEDIAN - RURAL

C.



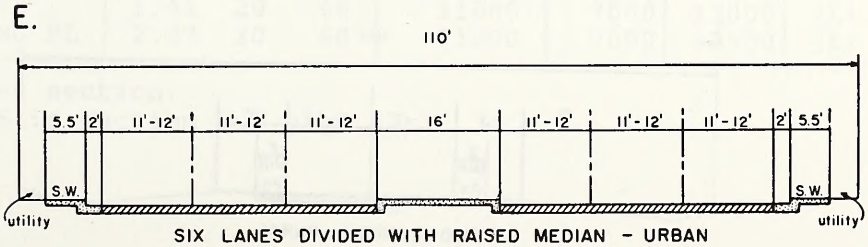

SEVEN LANES - URBAN

D.




FIVE LANES - URBAN

E.

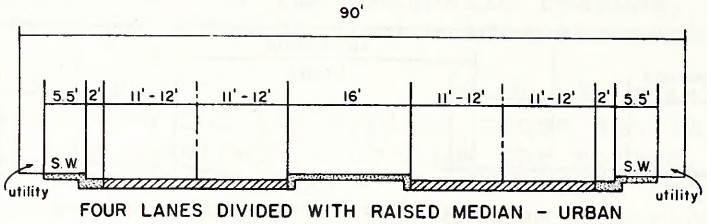



SIX LANES DIVIDED WITH RAISED MEDIAN - URBAN

**FIGURE 8**

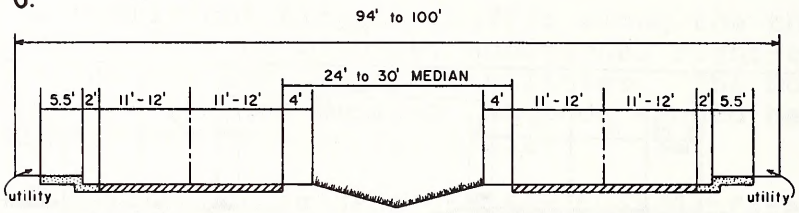
# TYPICAL THOROUGHFARE CROSS SECTIONS
(CONTINUED)

F.



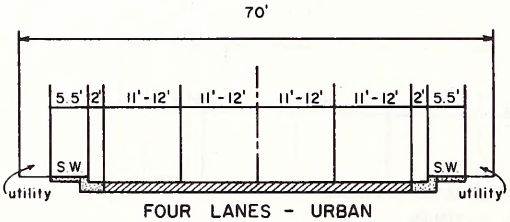

FOUR LANES DIVIDED WITH RAISED MEDIAN - URBAN

G.



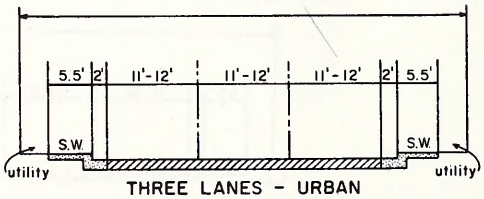

FOUR LANES DIVIDED - URBAN BOULEVARD
GRASS MEDIAN

H.



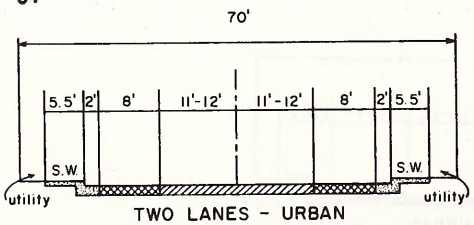

FOUR LANES - URBAN

I.



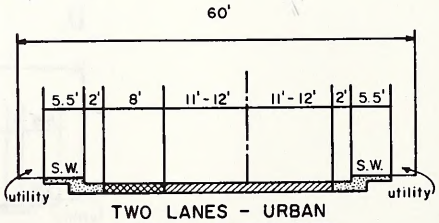

THREE LANES - URBAN

J.



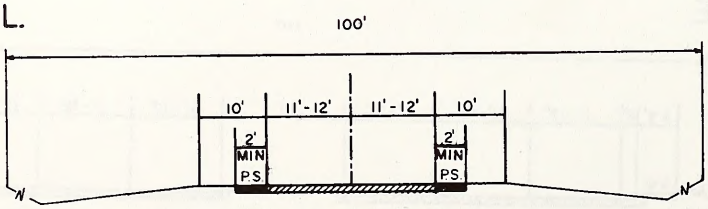

TWO LANES - URBAN
PARKING ON EACH SIDE

K.




TWO LANES - URBAN
PARKING ON ONE SIDE

L.




TWO LANES - RURAL

*APPENDIX A TABLE 1*
*THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS*

| FACILITY & SECTION | EXISTING X - SECTION DIST*RDWY*ROW MI * FT * FT | PRACTICAL LIMIT CURRENT (FUTURE) | 1989 ADTS | 2010 ADTS | RECOMMENDED X - SECTION RDWY * ROW (ULT) * (ULT) |
|---|---|---|---|---|---|
| US 321 | | | | | |
| HNC PL - MPL | 1.67 22 60 | 9200 | 6800 | 8400 | (L) (100) |
| US 321 FREEWAY | | | | | |
| MPL - HNC PL | 3.12 48 300 | (48000) | -- | 28800 | (A) (228) |
| NC 10 | | | | | |
| Lincoln Co - SR 1002 | 2.67 20 60 | 10000 | 4500 | 10300 | (L) (100) |
| SR 1002 - NC 127 | 5.57 20 60 | 10000 | 5300 | 12100 | (L) (100) |
| NC 127 - SR 1140 | 2.47 22 60 | 11000 | 3800 | 8700 | (L) (100) |
| SR 1140 - HNC PL | 2.13 24 60 | 12000 | 3800 | 8700 | (L) (100) |
| HNC PL - Catawba CL | 3.33 22 60 | 11000 | 2600 | 4400 | (L) ADQ |
| Catawba CL - SR 1004 | 1.00 26 60 | 12000 | 2600 | 4400 | (L) ADQ |
| SR 1004 - S. RR | 0.18 40 60 | 12000 | 2600 | 4400 | (L) ADQ |
| S. RR - US 70 | 0.75 22 60 | 11000 | 2600 | 4400 | (L) ADQ |
| NC 16 | | | | | |
| Lincoln Co - SR 1810 | 1.30 24 100 | 9900 | 6400 | 9700 | (G) ** 150 |
| SR 1810 - HNC PL | 7.80 24 100 | 9900 | 8700 | 11300 | (G) ** 150 |
| NC 18 | | | | | |
| Lincoln - Burke Co. | 3.06 24 60 | 9800 | 3000 | 4500 | (L) ADQ |
| NC 127 | | | | | |
| NC 10 - HNC PL | 1.20 24 60 | 9900 | 5800 | 10800 | (H) (70) |
| NC 150 | | | | | |
| Lincoln Co - Iredell | 7.74 24 60 | 9900 | 7100 | 16200 | (B) (200) |
| SR 1002 | | | | | |
| HNC PL - SR 1113 | 3.33 18 60 | 7000 | 1800 | 2500 | (L) ADQ |
| SR 1123 - Lincoln Co | 5.26 20 60 | 8200 | 800 | 1500 | (L) ADQ |
| SR 1003 | | | | | |
| Lincoln Co - SR 1858 | 3.33 20 60 | 8200 | 1200 | 2000 | (L) ADQ |
| SR 1858 - SR 1815 | 1.87 20 60 | 8200 | 2200 | 3500 | (L) ADQ |
| SR 1815 - SR 1821 | 3.00 20 60 | 8200 | 1400 | 2300 | (L) ADQ |
| SR 1004 | | | | | |
| SR 1833 - SR 2627 | 5.40 18 60 | 7000 | 1100 | 1800 | (L) ADQ |
| SR 2627 - NC 10 | 0.80 20 60 | 8200 | 1500 | 2200 | (L) ADQ |
| SR 1005 | | | | | |
| Lincoln Co - MPL | 1.41 20 60 | 11000 | 7000 | 13000 | (L) (100) |
| MPL - HNC PL | 2.87 20 60 | 11000 | 7000 | 13000 | (L) (100) |

** Hybrid cross section.
(see NC 16 in section V., page 32)

*APPENDIX A TABLE 1*
*THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS*

| FACILITY & SECTION | EXISTING X - SECTION DIST*RDWY*ROW MI * FT * FT | | | CAPACITY CURRENT (FUTURE) | 1989 ADT | 2010 ADT | RECOMMENDED X - SECTION RDWY * ROW (ULT) * (ULT) | |
|---|---|---|---|---|---|---|---|---|
| SR 1008 | | | | | | | | |
| Lincoln Co - NC 10 | 4.80 | 20 | 60 | 8200 | 3900 | 5900 | (L) | ADQ |
| NC 10 - HNC PL | 0.80 | 18 | 60 | 7000 | 3900 | 5900 | (L) | ADQ |
| SR 1146 EXT | | | | | | | | |
| SR 2007 - NC 10 | 2.80 | -- | -- | (13000) | -- | 4600 | (L) | (100) |
| SR 1722 | | | | | | | | |
| NC 10 - HNC PL | 1.02 | 18 | 60 | 7000 | 2800 | 3800 | (L) | ADQ |
| SR 1727 | | | | | | | | |
| NC 10 - HNC PL | 1.07 | 18 | 60 | 7000 | 200 | 300 | (L) | ADQ |
| SR 1810 | | | | | | | | |
| NC 10 - NC 16 | 5.30 | 20 | NA | 8200 | 1800 | 3000 | (L) | ADQ |
| NC 16 - MPL | 2.50 | 18 | NA | 7000 | 4100 | 6800 | (L) | ADQ |
| SR 1813 | | | | | | | | |
| SR 1003 - SR 1833 | 2.67 | 18 | NA | 7000 | 1300 | 2200 | (L) | ADQ |
| SR 1815 | | | | | | | | |
| SR 1003 - NC 150 | 6.67 | 18 | NA | 7000 | 700 | 1300 | (L) | ADQ |
| SR 1821 | | | | | | | | |
| SR 1003 - NC 10 | 2.40 | 18 | NA | 7000 | 800 | 1600 | (L) | ADQ |
| SR 1833 | | | | | | | | |
| SR 1904 - SR 1848 | 4.02 | 18 | NA | 7000 | 2500 | 1800 | (L) | ADQ |
| SR 1848 | | | | | | | | |
| SR 1833 - NC 150 | 6.60 | 20 | NA | 8200 | 800 | 1300 | (L) | ADQ |
| SR 1855 | | | | | | | | |
| NC 150 - SR 1003 | 5.60 | 18 | NA | 7000 | 1000 | 1800 | (L) | ADQ |
| SR 1003 - MPL | 0.73 | 20 | NA | 8200 | 2400 | 4300 | (L) | ADQ |

HNC PL: Hickory-Newton-Conover Planning Limit
Planning Limit
CL: City Limit
ADT: Average Daily Traffic
X-SECTION: Roadway Cross Section
ULT: Ultimate
MPL: Maiden
RDWY: Roadway
ADQ: Adequate
ROW: Right-of-Way
NA: Not Available

# APPENDIX B

## RECOMMENDED SUBDIVISION ORDINANCES

**DEFINITIONS:**

I. STREETS AND ROADS:

**A. Rural Roads**

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes, Intrastate routes, and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intrastate and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

**B. Urban Streets**

1. Major Thoroughfares - Major thoroughfares consist of Interstate, Intrastate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

## C. Specific Type Rural or Urban Streets

1. Freeway - Divided multilane highway designed to carry large volumes of traffic at higher speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. (Design speed 70 mph, Operating speed 55 mph to 65mph)

2. Secondary Freeway - A divided multilane roadway designed to carry moderate volumes of traffic at moderate speeds. The facility provides for the continous flow of traffic through full control of access and the provision of interchanges or grade separation with no access at cross roads, and no traffic signals. (Design speed 50-55 mph, Operating speed 40-45 mph)

3. Parkway - A divided multilane roadway designed for non-commercial traffic, with full or partial control of access. Grade separations are provided at major intersections and there are no traffic signals.

4. Expressway - A divided multilane roadway designed to carry heavy volumes of traffic with full or partial control of access. Interchanges are provided at major intersections. There may be access to service roads and local streets, but there will be no signalized intersections.

5. Secondary Expressway - A divided multilane roadway designed to carry moderate volumes of traffic at moderate speeds. This facility may have partial control of access with right turn in and right turn out access to abutting property, and interchanges at major intersections. Some minor intersections may have traffic signal control.

6. Urban Arterial - Multilane roadway with signalized intersections, and access to abutting property. May have grass or barrier type median, or middle left turn lane.

7. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

8. Local Residential Street - Cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

9. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

10. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

11. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. PROPERTY

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. SUBDIVISION

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides or develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or recombination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than ten acres where no street right-of-way dedication is involved, (3) widening of opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than two acres into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

**DESIGN STANDARDS**

I. STREETS AND ROADS

The design of all roads within Catawba County shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by Catawba County and North Carolina Department of Transportation.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of- way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out the Thoroughfare Plan.

| | Min. ROW |
|---|---|
| 1. Rural | |
| a. Principle Arterial | |
| Freeways | 350 ft. |
| Other | 200 ft. |
| b. Minor Arterial | 100 ft. |
| c. Major Collector | 100 ft. |
| d. Minor Collector | 80 ft. |
| e. Local Road | 60 ft.* |
| 2. Urban | |
| a. Major Thoroughfare other than Freeways, Expressways, and Parkways | 90 ft. |
| b. Minor Thoroughfare | 70 ft. |
| c. Local Street | 60 ft.* |
| d. Cul-de-sac | Variable** |

The subdivider will only be required to dedicate a maximum of 100 feet of right-of-way. In cases where over 100 feet of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 feet. On all cases in which right-of-way is sought for a fully controlled access

facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than sixty feet in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is subdivided, the remainder of the full required right-of-way shall be dedicated.

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* The desirable minimum right-of-way (ROW) is 60 ft. If curb and gutter is provided, 50 feet of ROW is adequate on local residential streets.

** The ROW dimension will depend on radius used for vehicular turnaround. Distance from edge of pavement of turnaround to ROW should not be less than distance from edge of pavement to ROW on street approaching turnaround.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. Local Residential
   Curb and Gutter section: 26 feet, face to face of curb
   Shoulder section: 20 feet to edge of pavement, 4 foot shoulders

2. Residential Collector
   Curb and Gutter section: 34 feet, face to face of curb
   Shoulder section: 20 feet to edge of pavement, 6 foot shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 5 mph greater than the posted speed limit. The design speeds for subdivision type streets shall be:

| DESIGN SPEEDS | | | |
|---|---|---|---|
| Facility Type | Design Speed Desirable | Minimum Level | Minimum Rolling |
| **RURAL** | | | |
| Minor Collector Roads | 60 | 50 | 40 |
| Local roads including Residential Collectors and Local Residential | 50 | 50* | 40* |
| **URBAN** | | | |
| Major Thoroughfares other than Freeways, Expressways, or Parkways | 60 | 50 | 50 |
| Minor Thoroughfares | 60 | 50 | 40 |
| Local Streets | 40 | 40** | 30** |

* Based on projected annual average daily traffic of 400-750. In cases where road will serve a limited area and small number of dwelling units, minimum design speeds can be reduced further.

** Based on projected annual average daily traffic of 50-250.

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

| MAXIMUM VERTICAL GRADE | | |
|---|---|---|
| Design Speed | Terrain Level | Terrain Rolling |
| 60 | 4 | 5 |
| 50 | 5 | 6 |
| 40 | 6 | 7 |
| 30 | | 9 |

b. Minimum grade should not be less than 0.5% .

c. Grades for 100 feet each way from intersections (measured from edge of pavement) should not exceed 5%.

d. For streets and roads with projected annual average daily traffic less than 250, short grades less than 500 feet long, may be 150% of the value in the above table.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

| SIGHT DISTANCE | | | | |
|---|---|---|---|---|
| Design Speed | 30 | 40 | 50 | 60 |
| Stopping Sight Distance | | | | |
| Minimum (ft.) | 200 | 275 | 400 | 525 |
| Desirable Minimum (ft.) | 200 | 325 | 475 | 650 |
| Minimum K* Value for: | | | | |
| Crest curve | 30 | 80 | 160 | 310 |
| Sag curve | 40 | 70 | 110 | 160 |

(General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)

---

* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve which will provide the desired sight distance.

Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1984".

4. The "Superelevation Table" below shows the maximum degree of curve and related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter of 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

| SUPERELEVATION TABLE | | | |
|---|---|---|---|
| Design Speed | Maximum e* | Minimum Radius ft. | Max. Deg. of Curve. |
| 30 | 0.04 | 302 | 19 00′ |
| 40 | 0.04 | 573 | 10 00′ |
| 50 | 0.04 | 955 | 6 00′ |
| 60 | 0.04 | 1,528 | 3 45′ |
| 30 | 0.06 | 273 | 21 00′ |
| 40 | 0.06 | 509 | 11 15′ |
| 50 | 0.06 | 849 | 6 45′ |
| 60 | 0.06 | 1,380 | 4 15′ |
| 30 | 0.08 | 252 | 22 45′ |
| 40 | 0.08 | 468 | 12 15′ |
| 50 | 0.08 | 764 | 7 30′ |
| 60 | 0.08 | 1,206 | 4 45′ |

e* = rate of roadway superelevation, foot per foot

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees. No street should intersect a railroad at grade at an angle less than (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 200 feet between survey centerlines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than five hundred (500) feet in length (for control of speed, visual detection of a dead end street, and for fire protection). The distance from the edge of pavement on the vehicular turnaround to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the

turnaround. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provision is make for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least twenty (20) feet.

3. Deadend alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turnaround facilities at the deadend as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:

   a. Shoulder section approach

      i. Under 800 ADT design year

Minimum 28 feet width face to face of parapets of rails or pavement width plus 10 feet, whichever is greater.

ii. 800 - 2000 ADT design year

Minimum 34 feet width face to face of parapets of rails or pavement width plus 12 feet, whichever is greater.

iii. Over 2000 ADT design year

Minimum width of 40 feet, desirable width of 44 feet width face to face of parapets or rails.

b. Curbs and gutter approach

i. Under 800 ADT design year

Minimum 24 feet face to face of curbs.

ii. Over 800 ADT design year

Width of approach pavement measured face to face of curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be 1'6" minimum, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 8' minimum, 10' desirable.)

b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

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